

The paradox of simultaneity: signal analysis

The form of the eight tracks on “Harry Pepl's Lonely Single Swinger Band (Volume One)” (2020) with line-up and entries by ear, compared with “Nach Saalfelden” (2002) and the Wayne Shorter Quartet

Daniel Pepl · harrypepl.com · Sunday, 18 October 2026

Companion to the article “The paradox of simultaneity: an appraisal”: <https://www.harrypepl.com/en/paradox-of-simultaneity/>

What this is about

In his home studio in Hernstein, Lower Austria, Austria, Harry Pepl recorded drums, guitar, bass and piano on his own, track by track, without a metronome and without later corrections. Yet the recordings of his Lonely Single Swinger Band sound like a band improvising together in the same moment. This analysis measures how the music unfolds over time: when each register enters, where the music grows denser and louder, where it pulls back. It is complemented by a listening analysis by Daniel Pepl: who plays when. What is measured, what is heard and what is interpretation are kept apart.

The method in plain words

- What was measured: the finished piece as it sounds on the CD, second by second. The basis is the lossless WAV masters, analysed with the freely available software ffmpeg and our own Perl scripts.
- Loudness: how loud a moment feels, measured according to the EBU R 128 standard also used by broadcasters and streaming services. Because all tracks were made equally loud in mastering, what counts is only how loudness changes within a track: 0 LU is the track's middle value, +3 LU clearly louder, -5 LU clearly quieter.
- Density (spectral flux): how much the sound changes from one moment to the next. Many new notes and strokes give high values, a sustained chord low ones. This shows where a lot is happening.
- Registers: the sound divided into three frequency ranges, low (below 200 Hz, for example bass and bass drum), mid (300 to 2500 Hz, for example guitar, piano and drums) and high (above 5 kHz, for example cymbals and hi-hat). When a register enters audibly, that hints at a new instrument, nothing more: one instrument can fill several registers, drums even all three.
- Stereo image: how widely the sound is spread between the left and right loudspeakers. This depends on the mix, not on the playing.
- Entry, pull-back, grid: an entry is the moment from which a register stays audible. A pull-back is a stretch of at least five seconds that is clearly quieter than the rest of the track. The grid test checks whether strokes recur at regular intervals, as with a metronome or a drum machine.
- Form curve: each track is divided into ten sections of equal length; for each section the average loudness and density are calculated. This allows pieces of different lengths to be compared and averaged.
- Ear: which instruments play and when they enter is something the measurement cannot tell. That comes from Daniel Pepl's listening analysis. Both are shown side by side, so that it stays visible where ear and measurement agree and where they do not.
- Comparison: for the Wayne Shorter Quartet the same measures were taken from six published live recordings. Only the course of the pieces is compared, not their quality.

Material and method in detail

- Source: WAV masters of the eight tracks on “Harry Pepl's Lonely Single Swinger Band (Volume One)”, Fullmax Recordings (the Vienna label), released on Wednesday, 20 May 2020 (UPC 195267035329). Composition and all instruments by Harry Pepl, multitrack recordings in his home studio in Hernstein; a recording date is documented only for track 1 (5 to 8 August 2004). For comparison, “Nach Saalfelden” from the Christmas CDs of 2002 (MP3 at 128 kbit/s from SoundCloud).
- All eight masters are matched to –13 LUFS. What carries meaning is therefore the course within a track, not the absolute loudness.
- Measured with ffmpeg (ebur128, spectralstats, astats, silencedetect) in one-second windows and evaluated with Perl. Loudness M according to EBU R 128, here relative to the track's median in LU; spectral flux as a measure of the density of new events; levels in three registers: low below 200 Hz, mid 300 to 2500 Hz, high above 5 kHz; S–M as side against mid signal (stereo width); LRA as loudness range.
- Entry: the first second from which a register stays, for 3 seconds, no more than 12 dB below its median. In addition, the full entry of the mid register is the point from which it stays, for 5 seconds, no more than 6 dB below its median. Pull-back: a 5-second window at least 5 LU below the track's median, excluding the first 15 and last 20 seconds. Pulse: highest autocorrelation of the onset envelope (10 ms) for lags of 0.25 to 1.5 seconds; values below about 0.1 mean that no regular grid dominates. Form curve: average per tenth of the duration.
- Wayne Shorter Quartet (Wayne Shorter, Danilo Pérez, John Patitucci, Brian Blade): six tracks from official uploads on the YouTube channel “Wayne Shorter - Topic” (Universal Music Group): “Footprints”, “Masqualero”, “Sanctuary” (Footprints Live!, 2002; recorded in 2001 at the Festival de Jazz de Vitoria-Gasteiz, Spain) and “As Far As The Eye Can See”, “Over Shadow Hill Way”, “Joy Ryder” (Beyond the Sound Barrier, 2005). These versions are lossy, which is sufficient for the shape of the form. The last 12 seconds (20 seconds for “Over Shadow Hill Way”) were left out because of applause. The recordings were only measured, not passed on.
- Listening analysis: Daniel Pepl, who from 1995/1996 was the sound engineer at many of the home-studio sessions, listened to all the tracks on 18 October 2026 and noted line-up, entries, exits and changes of tone with times. These appear in the chart “Who plays when” and as marks in the form curves; measurement and ear are compared separately.
- Limits: what is measured is the overall sound, not a single track. The measurement does not show which part answers which. The registers are frequency ranges, not instruments; drums fill all three. None of this is listening in the human sense. That an instrument is heard first in the finished piece says nothing about whether it was also recorded first.

On the instrumentation

Harry Pepl played all the instruments on this album himself. According to the listening analysis by Daniel Pepl (18 October 2026), six tracks are multitrack pieces: “Dedicated To Michel Noiret's Stockhausen”, “Meckis Dm Special” and “Git Trio 2” with drums, bass and electric guitar (in “Meckis Dm Special” also a synth saxophone in unison with the guitar), “Piano Drums” with piano and drums (brushes), “Scratchmo” with drums, fretless bass, scratching effects and electric guitar, “Git Trio 3” with bass, drums and electric guitar. “Abstract World” and “The Crow” are piano solos, played on keyboard. Pepl always played the bass on the guitar synthesizer, as he did the synth saxophone and probably the scratching; guitar and synth saxophone in “Meckis Dm Special” were recorded in a single pass. Until he recorded to hard disk from 2002, Pepl used ADAT, eight mono tracks, usually 1/2 drums, 3/4 bass, 5/6 guitar, 7/8 piano (Daniel Pepl's recollection; ADAT also in Heckel, pp. 62 and 84). Track 1 was recorded in August 2004, already in the hard-disk period. Which track of a piece was recorded first can no longer be said; often it was the drums (Heckel, Kohler, Daniel Pepl's recollection). Pepl worked the effects, ring modulator, chorus, reverb, delay and the distortion of a 19-inch Marshall unit, by hand while playing.

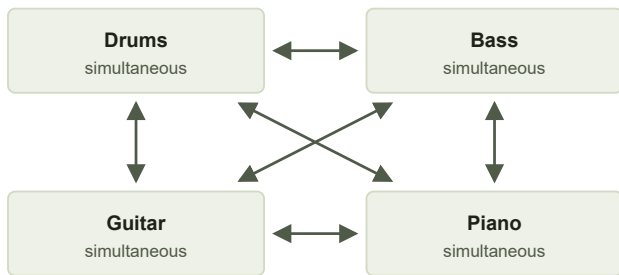
The charts

How the paradox arises

In an ensemble everyone hears everyone else in the same moment, and all adapt to one another. Pepl usually laid down the drums first, then guitar and bass, which he played on the guitar synthesizer, then piano or keyboard; each new track responds to the existing ones, while the earlier ones could no longer answer. In the finished mix, everything nevertheless sounds at once.

In an ensemble

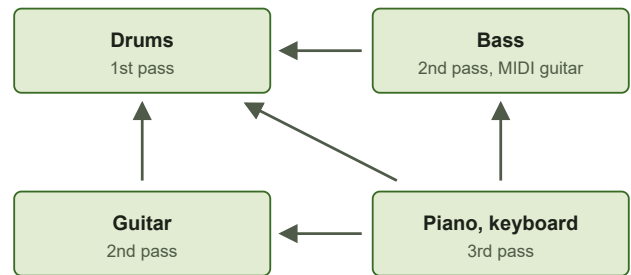
live, all at once



everyone hears everyone, in the same moment

In the home studio

Harry Pepl, track by track



each new track responds to the existing ones

ADAT, usually: 1/2 drums · 3/4 bass · 5/6 guitar · 7/8 piano

Process after Heckel 2024, pp. 158 and 259 f., and Kohler 2006, pp. 133 to 135 ("usually"; no metronome, no corrections). The order of guitar and bass between themselves is not documented.

Until hard-disk recording from 2002, Pepl recorded on ADAT: eight mono tracks or four stereo tracks (information from Daniel Pepl, 18 October 2026), usually 1/2 drums, 3/4 bass, 5/6 guitar, 7/8 piano (Daniel Pepl's recollection, 18 October 2026). Mutual adaptation in ensembles after Keller, Novembre and Hove 2014. Diagram: harrypepl.com.

Who plays when: line-up and entries by ear

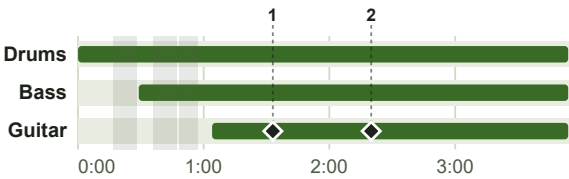
For each track, when each instrument can be heard and where Pepl changes tone or effect, after the listening analysis by Daniel Pepl; shaded grey, the measured pull-backs. In every piece with several instruments, one begins alone, usually the drums. The guitar, Pepl's main instrument, always enters last, in "Nach Saalfelden" at the same moment as the drums.

- Instrument can be heard, by ear; times as on the player
- Change of tone or effect; the number refers to the list below the title
- Measured pull-back from the signal analysis (not shown for "Nach Saalfelden")

ADAT, usually: 1/2 drums · 3/4 bass · 5/6 guitar · 7/8 piano

1 Dedicated To Michel Noiret's Stockhausen

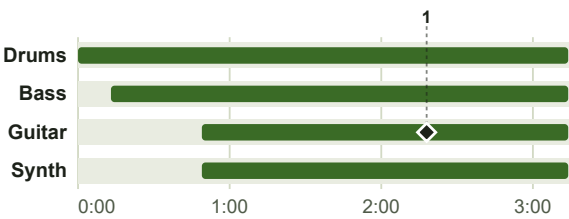
3:54 · drums, bass (guitar synthesizer), electric guitar



- 0:00 Drums: contemporary
- 0:29 Bass: acoustic bass via guitar synthesizer
- 1:04 Guitar: electric guitar
- 1:33 ❶ Guitar: ring modulator mixed in, turned off, later back
- 2:20 ❷ Guitar: ring modulator on again, chords, Pepl adjusts the effect by hand

3 Meckis Dm Special

3:14 · drums, bass (guitar synthesizer), electric guitar with synth saxophone



- 0:00 Drums
- 0:13 Bass: acoustic bass via guitar synthesizer
- 0:49 Guitar: electric guitar, probably ADAT 5/6
- 0:49 Synth: synth saxophone in unison, same pass
- 2:18 ❶ Guitar: distorted tone, synth saxophone continues

2 Abstract World

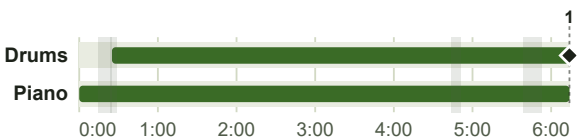
2:42 · solo piano (keyboard)



0:01 Piano: on keyboard, both hands

4 Piano Drums

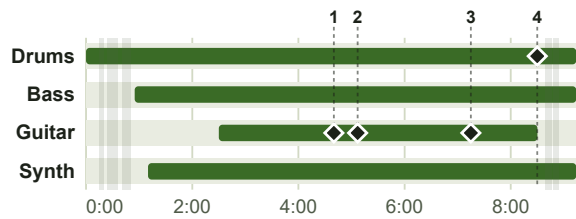
6:14 · piano and drums (brushes)



- 0:00 Piano
- 0:25 Drums: with brushes
- 6:14 ❶ end together

5 Scratchmo

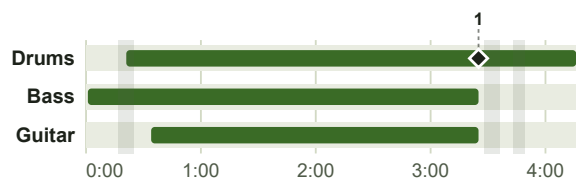
9:14 · drums, fretless bass (guitar synthesizer), scratching, electric guitar



- 0:00 Drums: muffled, specially tuned
- 0:55 Bass: fretless bass via guitar synthesizer
- 1:10 Synth: scratching, guitar synthesizer or keyboard
- 2:30 Guitar: electric guitar, distorted
- 4:40 ❶ Guitar: pad-like, clean, chordal
- 5:07 ❷ Guitar: distorted again, later audible delay
- 7:15 ❸ Guitar: cleaner tone
- 8:30 ❹ only scratching, bass and drums with cowbells
- 8:30 Guitar: no longer heard from 8:30

7 Git Trio 3

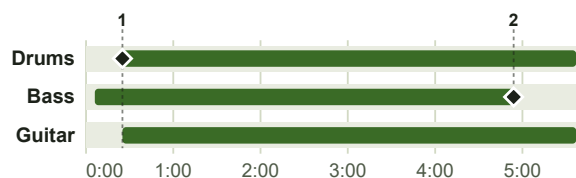
4:16 · bass (guitar synthesizer), drums, electric guitar



- 0:01 Bass: acoustic bass via guitar synthesizer
- 0:21 Drums: solo from 3:25
- 0:34 Guitar: jazz guitar with reverb and delay
- 3:25 ❶ Drums: drums alone, solo to the end
- 3:25 Bass: no longer heard from 3:25
- 3:25 Guitar: no longer heard from 3:25

Nach Saalfelden (2002)

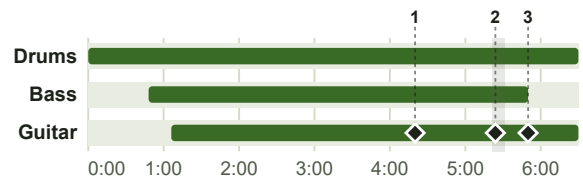
5:37 · bass (guitar synthesizer), drums, electric guitar



- 0:06 Bass: acoustic bass via guitar synthesizer
- 0:25 Drums
- 0:25 Guitar: electric guitar
- 0:25 ❶ drums and guitar enter at the same moment
- 4:54 ❷ Bass: bass no longer audible, only guitar and drums
- 4:54 Bass: no longer heard from 4:54

6 Git Trio 2

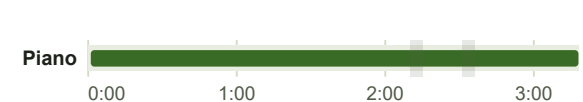
6:30 · drums, bass (guitar synthesizer), electric guitar



- 0:00 Drums: melodic, much bass drum
- 0:48 Bass: acoustic bass via guitar synthesizer
- 1:06 Guitar: jazz tone, little distortion
- 4:20 ❶ Guitar: distortion on, Marshall 19-inch unit
- 5:24 ❷ Guitar: distortion off, drums to the fore, clean guitar with reverb
- 5:50 ❸ Guitar: chorus or ring modulator, bass no longer audible
- 5:50 Bass: no longer heard from 5:50

8 The Crow

3:18 · solo piano (keyboard)



- 0:01 Piano: on keyboard, direct, small room

Listening analysis by Daniel Pepl, 18 October 2026; pull-backs: own measurement, October 2026.

The lanes show when an instrument can be heard in the finished piece, not the order of recording.

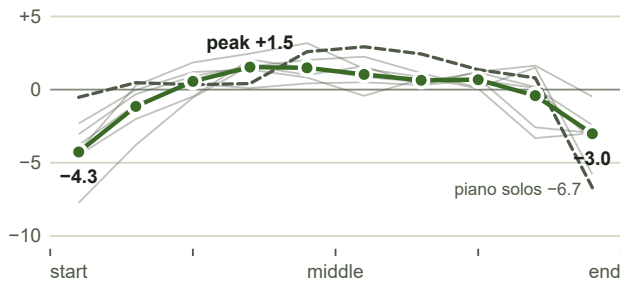
Pepl played bass, synth saxophone and scratching on the guitar synthesizer (scratching possibly on keyboard).

Form curves of the eight tracks on “Volume One”

How each track develops over its duration: loudness relative to the track's median (0 LU), with the three registers high, mid and low below; at the top, the entries of the instruments by ear. The first panel shows the average of the six multitrack pieces: an arch that rises towards the middle and falls back at the end; dashed, the average of the two piano solos.

Volume One, averaged

6 multitrack pieces per tenth of the duration; thin lines: single tracks; dashed: the 2 piano solos

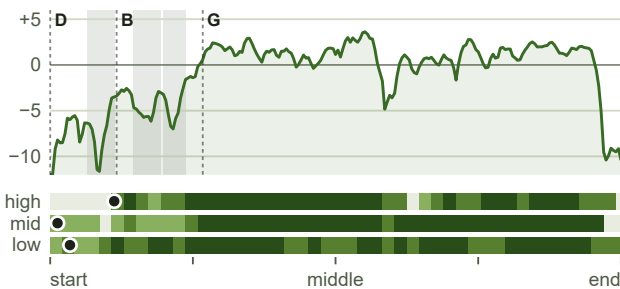


- Loudness, 5-second average, relative to the track's median (0 LU)
- Pull-back: 5 seconds at least 5 LU below the median (excluding start and end)
- Registers: high above 5 kHz, mid 300 to 2500 Hz, low below 200 Hz; the darker, the stronger (measured against the register's median)
- Entry of a register: from here on, for 3 seconds, no more than 12 dB below its median
- Entry of an instrument by ear (listening analysis by Daniel Pepl): D drums, B bass, G guitar, Sy synth, P piano
- Time normalised to the length of each track; “hardly any signal”: register almost empty (median below -55 dB)
- Reading aid: high mainly cymbals and hi-hat; mid mainly guitar, piano and drums; low mainly bass, bass drum and the piano's low register. Only frequency ranges are measured, not instruments: drums without cymbals show up in mid and low.

1 Dedicated To Michel Noiret's Stockhausen

3:52 · 3 pull-backs

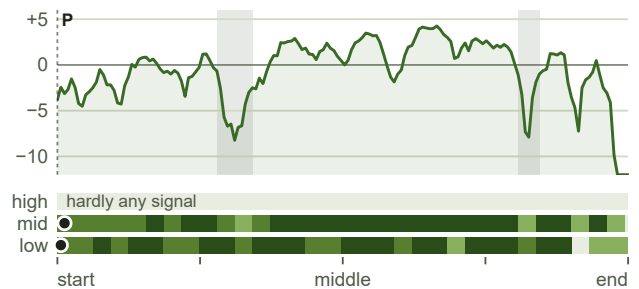
drums, bass (guitar synthesizer), electric guitar



2 Abstract World

2:41 · 2 pull-backs

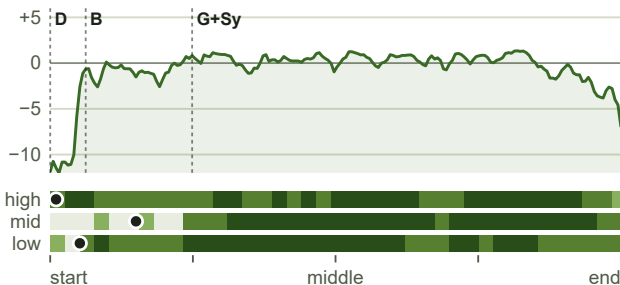
solo piano (keyboard)



3 Meckis Dm Special

3:13 · no pull-back

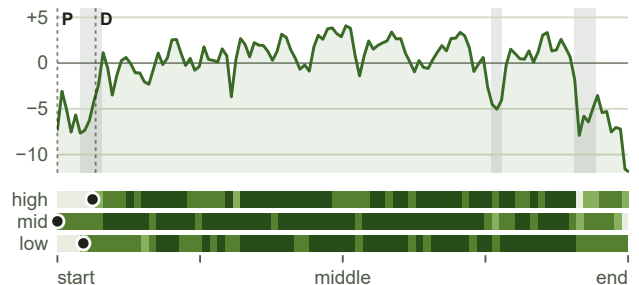
drums, bass (guitar synthesizer), electric guitar with synth saxophone



4 Piano Drums

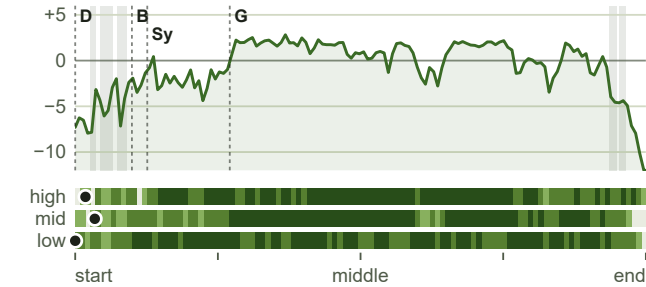
6:14 · 4 pull-backs

piano and drums (brushes)



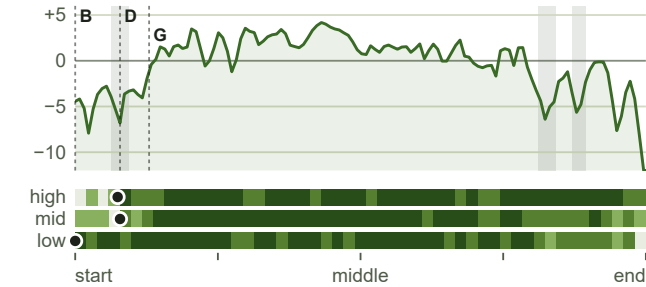
5 Scratchmo

9:14 · 5 pull-backs
drums, fretless bass (guitar synthesizer), scratching, electric guitar



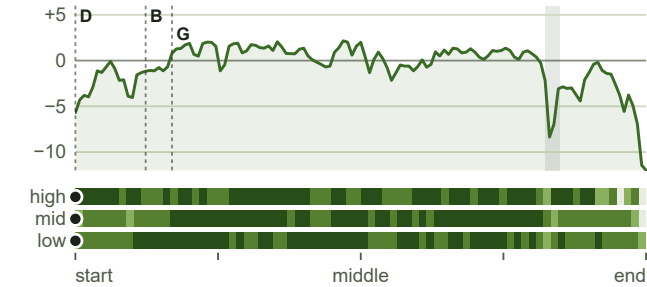
7 Git Trio 3

4:15 · 3 pull-backs
bass (guitar synthesizer), drums, electric guitar



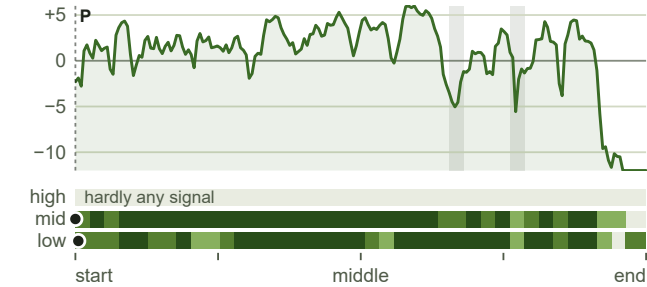
6 Git Trio 2

6:30 · 1 pull-back
drums, bass (guitar synthesizer), electric guitar



8 The Crow

3:17 · 2 pull-backs
solo piano (keyboard)



Own measurement: signal analysis of the WAV masters of "Harry Pepl's Lonely Single Swinger Band (Volume One)" (Fullmax Recordings, 2020), loudness according to EBU R 128, frequency bands, spectral flux; harrypepl.com, October 2026. Line-up and entries by ear: listening analysis by Daniel Pepl, 18 October 2026 (track 1 also after Heckel 2024).

No.	Track	Line-up by ear	Music	Entries by ear	Entry high	Entry mid	Entry low	Pull-backs	Densest point
1	Dedicated To Michel Noiret's Stockhausen	drums, bass (guitar synthesizer), electric guitar	3:52	drums 0:00, bass 0:29, guitar 1:04	0:28	0:05	0:10	3 (0:17, 0:36, 0:48)	87%
2	Abstract World	solo piano (keyboard)	2:41	piano 0:01	hardly any signal	0:03	0:02	2 (0:46, 2:11)	40%
3	Meckis Dm Special	drums, bass (guitar synthesizer), electric guitar with synth saxophone	3:13	drums 0:00, bass 0:13, guitar 0:49, synth 0:49	0:03	0:30	0:11	0	64%
4	Piano Drums	piano and drums (brushes)	6:14	piano 0:00, drums 0:25	0:23	0:00	0:17	4 (0:15, 0:24, 4:44, 5:39)	39%
5	Scratchmo	drums, fretless bass (guitar synthesizer), scratching, electric guitar	9:14	drums 0:00, bass 0:55, synth 1:10, guitar 2:30	0:10	0:19	0:00	5 (0:15, 0:24, 0:41, 8:39, 8:48)	33%
6	Git Trio 2	drums, bass (guitar synthesizer), electric guitar	6:30	drums 0:00, bass 0:48, guitar 1:06	0:00	0:00	0:00	1 (5:21)	33%
7	Git Trio 3	bass (guitar synthesizer), drums, electric guitar	4:15	bass 0:01, drums 0:21, guitar 0:34	0:20	0:21	0:01	3 (0:17, 3:28, 3:43)	43%
8	The Crow	solo piano (keyboard)	3:17	piano 0:01	hardly any signal	0:01	0:02	2 (2:10, 2:31)	57%

Tenth	Multitrack pieces (LU)	Piano solos (LU)
0 to 10%	-4.3	-0.5
10 to 20%	-1.1	+0.5

Tenth	Multitrack pieces (LU)	Piano solos (LU)
20 to 30%	+0.6	+0.3
30 to 40%	+1.5	+0.4
40 to 50%	+1.5	+2.6
50 to 60%	+1.0	+2.9
60 to 70%	+0.6	+2.4
70 to 80%	+0.7	+1.4
80 to 90%	−0.4	+0.8
90 to 100%	−3.0	−6.7

Form compared: Harry Pepl and the Wayne Shorter Quartet

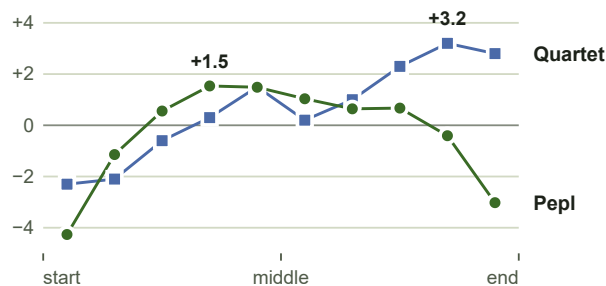
Averaged form curves in tenths of the duration. Both start below their own average and grow denser. In Pepl's music the peak lies in the middle and the music pulls back at the end; the quartet heads for a late climax.

Shape of the form, not a judgement of quality. The quartet played live and simultaneously in front of an audience; Pepl played alone, one track after another, in his home studio.

- Harry Pepl: the six multitrack pieces on "Volume One", recorded alone and one after another (without the two piano solos)
- Wayne Shorter Quartet: six live tracks from "Footprints Live!" (2002) and "Beyond the Sound Barrier" (2005)

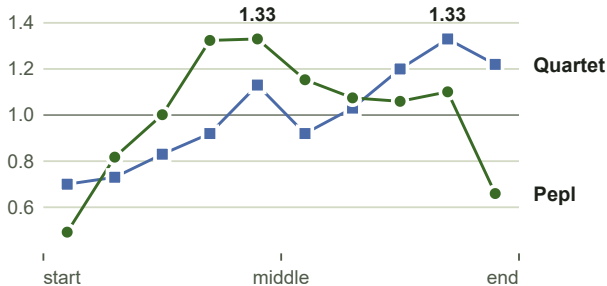
Loudness

LU, relative to the track's median



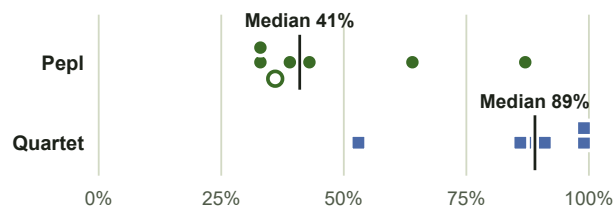
Density

spectral flux, relative to the average (1 = average)



Where is the densest point?

one dot per track, in % of the duration; line = median; Ring: "Nach Saalfelden"



Measured, in figures

- Densest point, median: Pepl 41%, quartet 89%
- Last tenth: Pepl -3.0 LU, quartet +2.8 LU
- Pull-backs per track, median: Pepl 3, after all instruments have entered 1.5; quartet about 8
- Similarity of the two average curves (correlation): loudness 0.27, density 0.34
- Shared: no rigid grid (pulse r at most 0.06 and 0.09)

Own measurement, signal analysis, October 2026. Pepl: WAV masters of the six multitrack pieces on "Volume One" (2020), "Nach Saalfelden" (2002) as a ring. Quartet: official uploads on the YouTube channel "Wayne Shorter - Topic" (Universal Music Group), without the last 12 seconds ("Over Shadow Hill Way": 20 seconds) because of applause. Only the shape of the form is compared.

Tenth	Pepl loudness (LU)	Quartet loudness (LU)	Pepl density	Quartet density
0 to 10%	-4.3	-2.3	0.49	0.70
10 to 20%	-1.1	-2.1	0.82	0.73
20 to 30%	+0.6	-0.6	1.00	0.83
30 to 40%	+1.5	+0.3	1.32	0.92
40 to 50%	+1.5	+1.5	1.33	1.13
50 to 60%	+1.0	+0.2	1.15	0.92
60 to 70%	+0.6	+1.0	1.07	1.03
70 to 80%	+0.7	+2.3	1.06	1.20
80 to 90%	-0.4	+3.2	1.10	1.33
90 to 100%	-3.0	+2.8	0.66	1.22

Track	Recording	Music	Densest point
Dedicated To Michel Noiret's Stockhausen	Volume One (2020)	3:52	87%
Meckis Dm Special	Volume One (2020)	3:13	64%
Piano Drums	Volume One (2020)	6:14	39%
Scratchmo	Volume One (2020)	9:14	33%
Git Trio 2	Volume One (2020)	6:30	33%
Git Trio 3	Volume One (2020)	4:15	43%
Nach Saalfelden	2002	5:27	36%
Footprints	Wayne Shorter Quartet, Footprints Live!	7:38	53%
Masqualero	Wayne Shorter Quartet, Footprints Live!	8:11	87%
Sanctuary	Wayne Shorter Quartet, Footprints Live!	5:16	91%
As Far As The Eye Can See	Wayne Shorter Quartet, Beyond the Sound Barrier	6:08	86%
Over Shadow Hill Way	Wayne Shorter Quartet, Beyond the Sound Barrier	12:13	99%
Joy Ryder	Wayne Shorter Quartet, Beyond the Sound Barrier	11:02	99%

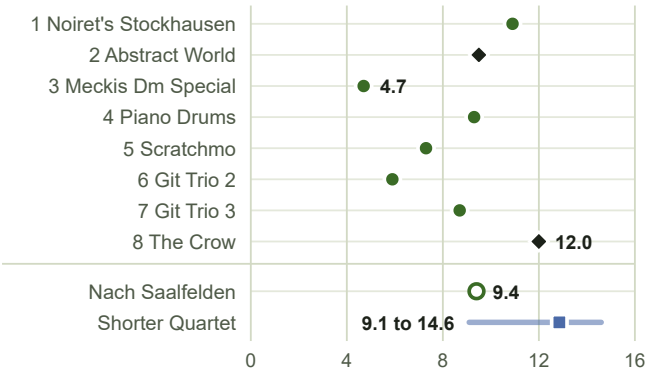
Key figures per track

Four measures for the eight tracks on “Volume One” (dot: multitrack piece, diamond: piano solo), plus “Nach Saalfelden” (2002) and the range of the six quartet tracks. No track shows a regular grid; loudness range and stereo image differ widely from track to track.

- Volume One (2020), multitrack piece
- ◆ Volume One, piano solo on keyboard
- “Nach Saalfelden” (2002)
- Wayne Shorter Quartet: range of the six tracks, square = median

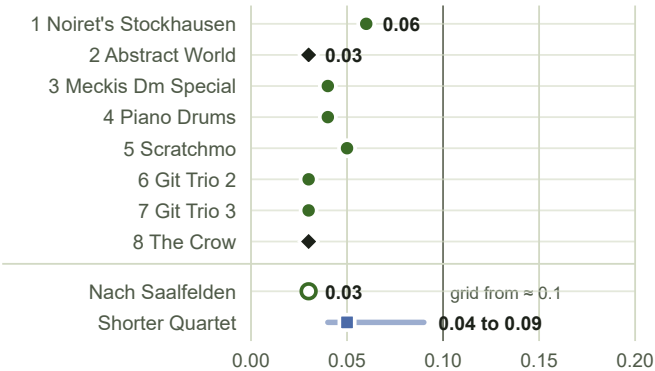
Loudness range

LRA in LU; larger means more dynamics



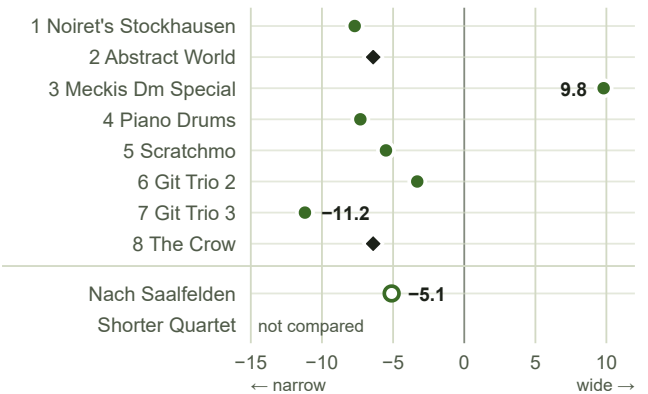
Pulse

highest autocorrelation r; from about 0.1 a regular grid



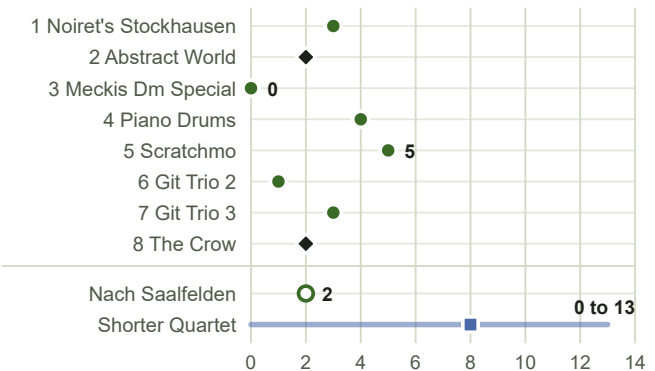
Stereo image

S-M in dB; above 0 very wide



Pull-backs

number per track



Own measurement, October 2026. LRA according to EBU R 128; pulse: highest autocorrelation of the onset envelope (10 ms) for lags of 0.25 to 1.5 seconds; S-M: side against mid signal; pull-back: 5 seconds at least 5 LU below the median, excluding the first 15 and last 20 seconds.

Track	Music	LRA (LU)	Pulse (r)	S-M (dB)	Pull-backs
1 Dedicated To Michel Noiret's Stockhausen	3:52	10.9	0.06	-7.7	3
2 Abstract World	2:41	9.5	0.03	-6.4	2
3 Meckis Dm Special	3:13	4.7	0.04	+9.8	0
4 Piano Drums	6:14	9.3	0.04	-7.3	4
5 Scratchmo	9:14	7.3	0.05	-5.5	5
6 Git Trio 2	6:30	5.9	0.03	-3.3	1
7 Git Trio 3	4:15	8.7	0.03	-11.2	3
8 The Crow	3:17	12.0	0.03	-6.4	2
Nach Saalfelden (2002)	5:27	9.4	0.03	-5.1	2
Wayne Shorter Quartet, Footprints	7:38	10.1	0.05	not compared	9

Track	Music	LRA (LU)	Pulse (r)	S-M (dB)	Pull-backs
Wayne Shorter Quartet, Masqualero	8:11	13.1	0.05	not compared	7
Wayne Shorter Quartet, Sanctuary	5:16	14.3	0.05	not compared	2
Wayne Shorter Quartet, As Far As The Eye Can See	6:08	9.1	0.04	not compared	0
Wayne Shorter Quartet, Over Shadow Hill Way	12:13	14.6	0.09	not compared	10
Wayne Shorter Quartet, Joy Ryder	11:02	12.6	0.09	not compared	13

Measured and heard

- In all six multitrack pieces and in “Nach Saalfelden” one instrument begins alone: the drums four times (tracks 1, 3, 5, 6), the bass twice (“Git Trio 3”, “Nach Saalfelden”), the piano once (“Piano Drums”). The second voice follows after 13 to 55 seconds. In every track with guitar, the guitar enters last (after 34 seconds to 2:30), in “Nach Saalfelden” in the same second as the drums.
- Measurement and ear usually agree on the entries to within a few seconds. Where they do not, the method is the reason: drums fill all three registers, so the measurement finds an immediate joint start in “Git Trio 2”, although the drums play alone for 48 seconds.
- In the four tracks that begin with the drums, the big rise in loudness coincides with the entry of the guitar. Measured breaks coincide with changes of guitar tone (track 1 at 2:20, track 3 at 2:18, track 5 at 4:40 and 5:07, track 6 at 5:24).
- In the multitrack pieces, density rises on average from the first tenth (0.49 times the track average) to 1.32 to 1.33 times in the fourth and fifth tenths. The densest point usually lies between 33 and 64% of the duration (median 41%), only in track 1 late (87%).
- 0 to 5 pull-backs per multitrack piece (median 3); 9 of the 16, however, come before the last instrument has entered and belong to the opening phase; after that the median is 1.5. In the last tenth the multitrack pieces pull back on average to –3.0 LU below the median; “Git Trio 3” ends with a drum solo.
- The two piano solos begin close to the median (–0.5 LU), the multitrack pieces well below it (–4.3 LU). Both show a peak around the middle and a withdrawal at the end (solos: +2.9 LU in the sixth tenth, end –6.7 LU).
- No track shows a regular grid (highest autocorrelation 0.06). This rough measurement also fails to find the “quasi-swing at tempo 120” that Heckel describes in track 1; it only shows that no machine-like regular sequence of onsets dominates.
- Between the first and the last note there is no silence in any track; the only exception is 0.7 seconds in track 1 at 0:05.
- In the comparison, the quartet's densest point usually comes late (53 to 99%, median 89%), that of Pepl's multitrack pieces in the first third up to the middle (median 41%). On average the quartet ends on its loudest section (+2.8 LU), while Pepl pulls back (–3.0 LU). The two average curves correlate only weakly (loudness 0.27, density 0.34). What both share: no rigid grid, and density growing out of a few voices.

Interpreted

- The multitrack pieces have the shape of groups improvising together: one instrument begins, the others join one after another, the music grows denser towards the middle and pulls back at the end. The guitar, Pepl's main instrument, comes in like a soloist over a rhythm section that is already running.
- The two piano solos, which Pepl played alone on keyboard, also show the peak around the middle and the withdrawal at the end. The arch is therefore probably Pepl's own sense of form; the multitrack method adds the quiet, staggered opening. With only two solos this is an indication, not proof.

- Two moments show the paradox most clearly: in “Nach Saalfelden” drums and guitar enter in the same second; recorded one after the other, the later track had to hit the entry of the earlier one exactly. In “Piano Drums” piano and drums break off together at 5:40 and end together. Some things, by contrast, really are simultaneous: guitar and synth saxophone in “Meckis Dm Special” come from a single pass on the guitar synthesizer.
- Whether the order of entries matches the order of recording remains open. Where bass or piano begin (“Git Trio 3”, “Nach Saalfelden”, “Piano Drums”) and the drums were nevertheless recorded first, Pepl left 21 to 25 seconds empty at the drums and anticipated the entry of a part played later. The surviving individual tracks could settle this.
- The closeness to the Wayne Shorter Quartet that Daniel Pepl hears probably concerns the interplay in detail (floating entries, collective thickening without a fixed grid) rather than the large-scale form. These measurements can neither prove nor disprove this.

Sources

- Daniel Pepl: listening analysis of “Volume One” and “Nach Saalfelden”, Sunday, 18 October 2026 (archive of harrypepl.com).
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- Wayne Shorter Quartet, official uploads “Wayne Shorter - Topic”: youtube.com/watch?v=qkQtXpw1bw (Footprints), SscEURPenLs (Masqualero), 03zjME9v2OE (Sanctuary), OOE3H_0nlgs (As Far As The Eye Can See), OvYWzHA6Nj0 (Over Shadow Hill Way), PQVnvqRMGkk (Joy Ryder).

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